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SELF-RIGHTING ACTION OF COAST GUARD EXPERIMENTAL SR-I LIFEJACKET COMPARED WITH OTHER LIFEJACKETS

W. E. Creedon

Coast Guard Baltimore, Maryland

15 October 1946

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RESEARCE AND DEVELOPMENT DEVELOPMENT DIVISION SELF-RIGHTING ACTION OF COAST DIVISION CHARLIFFIACKETS

REPORT

Report No. 1 Project No. CGTD-3-13-46 15 October: 1946 J18-3/3-5-3

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UNITED STATES COAST GUARD

WASHINGTON 14 Nov., 1946

Memorandum for Floating Units Division
Attn: Lt.Cdr. Wilcox
Subj: Report on self-righting characteristics
of life jackets

- 1. Inclosed for your information and file is a copy of Report No. 1 of Research Project CGRD-3-13-46 dated 15 October, 1946. This report covers tests conducted to compare the self-righting characteristics of a new Coast Guard experimental model jacket with various other jackets now in use.
- 2. Moving pictures covering these tests are available in the Testing and Development Division, Room 5210, for observation by interested parties.

R. D. SCHMIDTHAN
Acting Chief, Testing and
Development Division

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U. S. COAST GUARD FIELD TESTING AND DEVELOPMENT UNIT COAST GUARD YARD CURTIS BAY, MARYLAND

15 October 1.946

Project No. 0310-2-13-46 J28-3/3-5-3

Report No 1

SELF-RIGHTING ACTION OF COAST GUARD EXPERIMENTAL SR-1

LIFEJACKET COMPARED WITH OTHER LIFEJACKETS

Submitted by:

WE CULLON

Commander USCO

Commander C

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Details of illustrations in this document may be better studied on microfiche

Approved for public scales

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INTRODUCTION

The wearer of a lifejacket who is unconscious upon entering the water, or any time thereafter, or too weak to assist himself, must rely on his lifejacket to bring and hold his face clear of the water to permit breathing for survival. Realizing the importance of this function of a lifejacket, the Coast Guard has under development an Experimental SR-1 lifejacket designed especially to produce self-righting.

Commander No DeNartino, USCG, submitted the original design of the Experimental SR-1 lifejacket to the Field Testing and Development Unit and supervised the construction of test samples at the Goast Guard YARD.

The Experimental SR-1 lifejacket is intended for use by Coast Guard personnel on surface vessels; for wear at all times, including at work, in war time; to be worn, in peace time, only when the nature of the work requires its use.

This report is conce ned mainly with a comparison of the self-righting preperties of the Experimental SR-1 lifejacket and several types of present day lifejackets.

SUMMARY

The Coast Guard is developing a new lifejacket for use by Coast Guard personnel on surface vessels.

It is designed especially to bring and hold the wearer's face clear of the water to permit breathing for survival when the wearer is uncenscious or toe weak to assist himself.

Lifejacket wearers were instructed to take a position face down in the water and assume complete relaxation as if unconscious. For the types of lifejackets tested. THE PERCENTAGE OF TRIALS ON WHICH THE LIFEJACKET SUCCESSFULLY RIGHTED THE WEARER IS SUMMARIZED.

Coast Guard Experimental SR-1 lifejacket (worn by 13 men for a total of 126 trials	97.65
Coast Guard Model 2 Lifejacket (wern by 8 men for a total of 24 trials)	91.78
Mellon Institute Ja40 Lifejackets (worn by 13 men for a total of 24 trials)	86.5%
Medified Navy Standard Lifejacket (Fiber-	

A 16 MM, silent, colored, metion picture of the trials, entitled "Self-righting Astion of the Coast Guard Experimental SR-1 Lifejacket Compared with other Lifejackets" is available at the Office of the Chief, Testing and Development Division, U.S.C.G. Headquarters, Washington, D. C.

(worn by 13 men for a total of 114 trials) 40-9%

glas used in lieu of Kapek)

PROCEDURE

The first trials of the Coast Guard Experimental SR-1 lifejacket (see description, page 8) were conducted on 5 August, 1946, from a pier at Fort Smallwood, Baltimore Harber, Maryland, in deep water in a flat calm and no sea. Eight enlisted men, garbed in bathing trunks only, were the Experimental SR-1 lifejacket and a Modified Mavy Standard lifejacket (see description, page 11) in turn. Each jumped feet first into the water with instructions to exhale a normal amount of air, take a position face down in the water, and assume complete relaxation, as if unconscious. Each man made three trials starting with arms along the sides; three more trials starting with arms extended straight beyond the head. Observations were made of the success or failure of the lifejackets to bring and keep the face of the wearer clear of the water to permit breathing.

Mere trials were conducted on 27 August, 1946; at the same location. On this occasion there was a choppy sea of about one foot height, some whitecaps, and a 15 mile wind. Right enlisted men, clothed in dungarees and exford type Navy shoes, were the Experimental SR-1, the Modified Navy Standard, and the Mellon Institute J-40 lifejacket (see description, page 7) in turn Trials and observations were as before.

On 7 October, 1946 a demonstration was conducted in an open fresh water peol in Washington D. C. Right enlisted men clethed in dungarees and Army field shoes were each of the following lifejeckets in turn: Coast Guard Experimental SR-1, Medified Mavy Standard, Mellon Institute J-40, and the Coast Guard Model 2 lifejacket (see description, page 10), which is standard for the Merchant Marine. Each man jumped feet first into the poel, swam to a designated location with instructions to inhale a normal amount of air, take a position face down in the water and assume complete relaxation as if unconscious. Each man made one trial starting with arms along the sides; two more trials starting with arms extended straight beyond the head. Observers recorded, and camera men took movies of, the success or failure of each lifejacket to bring and keep the wearer's face clear of the water to permit breathing.

To determine the "static" buoyancy, each lifejacket was wrapped around a heavy metal frame and suspended in a vertical position in a tank of fresh water se as to submerge the topmest part of the jacket two inches. The weight in water of the frame alone, minus the weight in water of the jacket clad frame, gave the buoyancy. This method has been employed by the Mellon Institute of Industrial Research.

The dry weight of the pad inserts, also the entire lifejackets, was determined.

Present at the demonstration on 7 October, 1946, were the following: Mr. E. B. Amey and Mr. E. A. Utecht of the Buresu of Ships, U. S. Navy; Mr. G. W. Johnston, of the Research and Development Division. Transportation Corps. War Department; Commander N. DeMartine and Lieutenant J. E. Waters of the Search and Rescue Agency, U. S. Coast Guard; Mr. R. G. Hale and Mr. P. Gibson of the Merchant Marine Technical Division, U. S. Coast Guard; and members of the Testing and Development Division, U. S. Coast Guard; who conducted and observed the tests.

DISCUSSION

The Coast Guard Experimental SB-1 lifejacket has an innevation of design in that it has two front flap pads that are intended to be wern in one position for continual shipboard wear and in another position for wear in the water. The tests conducted in this report, with one exception, were with the front flap pads in the front (waterwear) position. In the only trial in which the front flap pads were not secured in the front (water-wear) position, the jacket satisfactorily righted the wearer. Additional tests of the self-righting qualities of the jacket, with front flap pads not secured in the water-wear position, are contemplated.

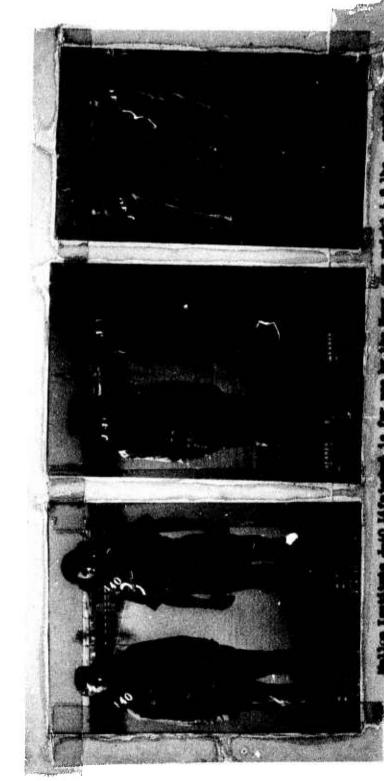
The Navy Standard lifejacket tested was a modification of Navy Specification 25 P-12 INT in that the cotten drill envelope had not been treated with flame-preefing compound, also Fiberglas was substituted for Kapuk as the buoyant material.

The dry weight of the lifejackets was determined as: Mellen Institute J-40, 4.9 lb.; Coast Guard Experimental SR-1, 6.0 lb. Modified Mavy Standard, 5.2 lb.; Coast Guard Model 2, 3.0 lb. In explanation of the variance, the Coast Guard Model 2 is lightest due primarily to the use of Kapok in lieu of Fiberglas which is employed in the other three, the ratio of weight of Kapok to Fiberglas being 1 to 2.2 for equal buoyanay, according to the Mellon Institute of Industrial Research reports; the Coast Guard Experimental SR-1 lifejacket is heaviest primarily because it is the only one of the feur lifejackets which had the envelope material imprognated with flame-proofing compound, the flame-preefing compound causing an increase in weight of cotton drill of about 50%.

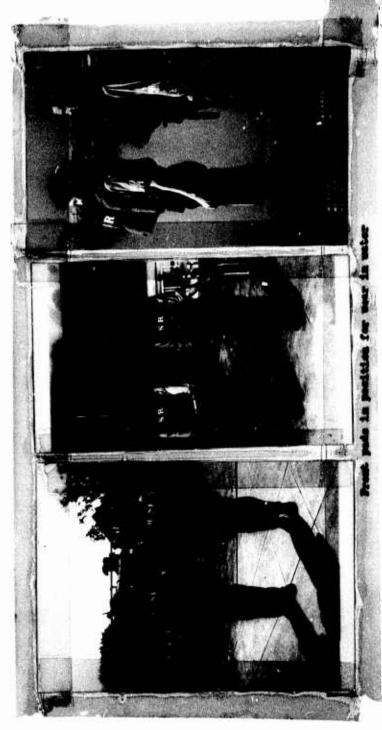
The wearers of the lifejackets were instructed to relax as if unconscious but they were noticeably handicapped by the celd. Although it has not been demonstrated that a conscious person can assume the relaxed affitude of an unconscious person in water, the use of conscious persons was resorted to, to avoid detrimental physical aftermath.

On the 5 and 27 August tests, data was taken of elapsed time from start to face clear of the water to permit breathing, also from start to wearer in final position. On the demonstration, 7 October, time was recorded for face to clear the water, except that on the Goast Guard Experimental SR-1 lifejacket, the recorder, due to a misunder-standing, recorded the time from start to wearer in final position.

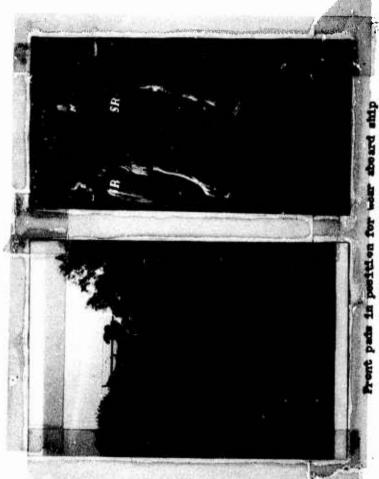
Due to the shortage of personnel, no attempt was made to secure men of unusual physical characteristics. However, it is believed that the subjects employed are representative of the personnel serving on Coast Guard wessels.



0



is Mylen. The two front pads are held in the open position by two snape on each pad; tied tegether in front by tie tabs. For continual wear aboard ship the front pade are intended te be snapped back in open position; made fast in front by tie tabs just prior te entering The side of the collar against the wearer's face Geast Guard Experimental SE-1 Lifejacket is for use by Coast Guard personnel on surface berne vessels, total dry weight 6.0 lbs., envelope centains 3.4 lbs. Fiberglas for busyancy, pad cover material is muslin and envelope material is flame-proofed cotten drill, and has one log strap and has a collar. the water.

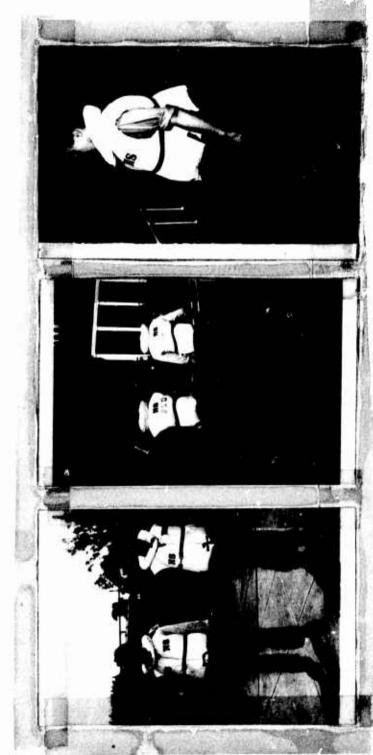


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Additional views of Goast Guard Experimental SB-1 Lifejacket. See description on previous page. He rear view photograph is shown because it is identical with view on previous page for lifejacket in front (mater-mean) position.



The state of the s



used in place of Kapek and envelope is not flame-presfed) is for use by the Mavy, tetal dry weight 5.2 lb., envelope centains 3.7 lb. of Piberglas for bueyancy, pad wer material is smalln and envelope material is drill, has two log straps and a

minimal filmer block

CHIM ON TEST OF COAST GUARD EXPERIMENTAL SR.1 LIFEJACKET IN OPEN FIESH "ATER POOL."
7 OCTOBER, 1946. MEN MORE DUNCAREES AND ARM ISSUE SHOES.

Code designation of wearar	"A" Destine	"B" F.6" 130∰	nGn Hering 6 24 18%	"D" Kesmesid 6.1" 190#	Nevick 5:10"	erth Suga 140	#G" #alker 5:8" 125#	150¢
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Sars and face clear of water on successes	Ie.	Ios	Š	ĭ.	Š	Ĭ.	Ĭ0.	Ze.

^{*} The time is from start to wearer righted to final position, whereas on the other tests on this date, the times recorded are from start to face clear of the water.

MO WIND. TEST OF MODIFIED NAVY STANDARD LIFEJACKET IN OPEN FRESH ..ATER POOL. ? OCTOBER, 1946. MEN HORE DUMLAREES AND ARMY ISSUE SHOES

Code designation of wearer Wearer s name Helght	nAn Devine 5.7m 150#	ngs Hadden 5-6 ⁿ 130	nCn Herdag 6.2u 185∰	^B D ^H Kesmoskd 6 1 ^H 190∰	"E" ¥•v± ck 5′10" 160#	Sect t., 5:8!! 140#	igu falker 5 8º 12%	Meere 5 9 a 150#
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Bars and face clear of the water on successes		ţ	÷	90	Ų	Yes	You	•

NO .IND. TEST OF MELLON INSTITUTE J 40 LIFEJACKET IN OPEN FARSH NATER POOL, 7 CCTOBER, 1924 MEN WORE DUNGAREDS AND ARMY ISSUE SHOES.

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TEST OF COAST GUARD MODEL & LIFEJACKET IN OPEN FRESH MATER POOL. NO MIND. 7 OCTOBER, 1946. MEN MONE DUNGMEDES AND ARAI ISSUE SHOES.

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	AND AL SIME AL START (TRIAL #1)	,							
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; -	Direction turned by lifejacket	Bekwd	Bekwd	Bekwd	Bekwd	Bcknd	Bckwd	Bckwd	9
,	Secs. face down on failures to right	8	t)		•	ť	U	8	Not recerded
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	Secs. face down on fallures to right.	, ,		2		l L	0	J	Not recorded
	ABMS EXTENDED FORWARD AT START (TRIAL #3)	,,,,							
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	Secs. for face to come clear and come	-1	(F)	, K	4	, to	. «		7
	Direction turned by lifejacket	Bckwd	Bekwd	Bckwd	Bekwd	Beknd	Bekwd	Bekad	Beirnd
	Secs, face down on failures to right =	e	C	0	0	O	9	Û	Û
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to right	20	Ş			3			()
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Number of trials on which face was	1		1	١	١	•	,	`
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Avg. sec. for face to be brought								ı
clear of water	12	ce	7	හ	n	2	- t -	6
Avg sec. for righting to final								
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nel 17 15 – 8 14 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	elear of water of a second	e-i	3.0		¥C)	-4	rt	8	5
res 17 35 - 8 34 7 7 7 7 7 7 7 7 7 7 7 7 7 7 8 8 8 8 8	wg. sec. for righting to final								
Free Boxwd Boxwd Boxwd Boxwd Sdwse	pesition as a market market	1.7	V *	1	Q	77	C	~	t'-
Bokwd Bokwd Bokwd Bokwd Bokwd Sdwse	vg. sec. face down on failures								
BOKED BOKED BOKED BOKED BOKED OFFER STANDER	to right and an analysis			G					
	fraction turned on successes	BCKWd	Bokwd		Bokwd	Bekwd	Sdase	· Sdwse	Scwse

TEST OF MODIFIED NAVY STANDARD LIFEJACKIT IN CHASAPEAKE BAY. NO SEA. NO TIND. 5 AUGUST, 1946. MEN JOHE BATHING TRUNKS AND NO SHUES.

						2			
	Moaror Moaror	Mott	Sikorski	Her tng	Mere	Novick	Walker	Anderson	Sanders
_	Hedght	¥6 \$	5 8"	6 2#	16 5	5,10"	5:8"	2.6	5:8"
	Ned ght	#091	兆71	185#	150	160%	125#	140%	170#
	ARMS AT SIDE AT START								
	Number of trials	m	m	6)	8	3	m	4	8
	Number of trials on which face was								
	brought and kept clear of water	N	0	0	0	0	٣	0	6
	Avg. sec. for face to be brought								i
	clear of water	(-		•	:	ř.	-1	D	4
	Avg. sec. for righting to final	•							
	position	∞		*,	, to	0	74	t	80
	Avg. sec. face down on failures								
	to right as a second as a second	15	17	13 N	Ne data	11	J	15	1)
	Directien turned on successes	Sdwse	U			. 0	Sdwse	С	Sdwse
•	ARMS EXTENDED FORWARD AT START								
	Number of trials owerer award	W	m	m	3	m	n	0	0
R	Number of trials on which face was								
epr	breught and kept clear of water and	0	0	ဂ	0	0	0	G	0
od	Avg. sec. for face to be brought								
uce	clear of water	1	Û	8	Ó.	0	•	2	•
be	Avg. sec. for righting to final								
fro	position	Ĉ	1	C	6	0	17	8	0
m	Avg. sec. face down on failures								
	to right	4	18	21	No data	17	C	ı	ð
	-	0	0	£	6	,	Sdwge	C	
an G									

BUOYANCY OF LIFEJACKETS EMPLOYED IN TEST (Determined by Static Tank Method)

	K•d1	Wedified Nav	vy Standard	Wellen	Institu	ute Je40	Coast	Quard Med	Mellen Institute J-40 Ceast Guard Medel Ne. 2 C.G. Experimental SR 1	30.0	perlments	SB 1
*		#5	AVB	#1 #5	#5	AVE	#1 #5	#2	BAW	#	## Y	AVE
<pre>5 winute Buoyancy (p.unde)</pre>	39.2	707 2	39.8	29.1	29°1 27°3 28°2	28°2	29.2 28.9	28.9	29°1	33°3	33°0	33°5
6 Hour Busyancy (peunds)	37.	37°4 38°0	37.7		28.8 2 7.0 27.9	27.9	23.7 24.7	24.07	24.2	31.7	31.4	31°6
24 Hour Busyancy (pounds)	37.	37.2 37.8	37.5	28.1	26.4	28°1 26°4 27°3 19°5 20°6	19.5	20°6	20°1	30°9	30°9 30°5	30.7

∞ 2½ □

* Two jackets of each type were employed.